

WHAT IS CLAIMED IS:

1. A host device couplable to a remote device via a single wire pair,  
said single wire pair comprising a first wire and a second wire, said remote  
device comprising first remote signal generation circuitry operable to  
generate a first remote signal and a first remote current modulator operable  
to modulate a current component of a power signal present on said single  
wire pair with said first remote signal when said first remote signal is  
communicated to said host device, said host device comprising:  
a voltage reference and control loop circuit which generates and  
enforces a substantially constant voltage component of said power signal  
present on said single wire pair during communication of said first remote  
signal to said host device; and  
a first host current de-modulator operable to de-modulate said first  
remote signal from said current component of said power signal present on  
said single wire pair during communication of said first remote signal to said  
host device.

2. A host device in accordance with claim 1, wherein:  
said voltage reference and control loop circuit comprises:  
a voltage generator which generates a substantially constant  
reference voltage during communication of said first remote signal to  
said host device;  
an operational amplifier having a first input terminal coupled to  
receive said reference voltage, a second input terminal coupled to  
said first wire, a feedback resistor coupled between said output  
terminal and said second input terminal, and an output terminal which  
outputs an operational amplifier output voltage signal that reflects a  
current that is passing through said feedback resistor, wherein said  
operational amplifier operates to mirror said reference voltage  
received at said first input terminal on said second input terminal; and  
said first host current de-modulator comprises:  
a filter which filters said operational amplifier output voltage  
signal to recover said first remote signal.

3. A host device in accordance with claim 2, comprising:  
2 host signal generation circuitry operable to generate a host signal;  
a host current modulator operable to modulate said current  
4 component of said power signal present on said single wire pair with said  
host signal while said voltage reference and control loop circuit enforces a  
6 substantially constant voltage component of said power signal present on  
said single wire pair during communication of said host signal to said remote  
8 device;

wherein said remote device comprises:  
10 a remote current de-modulator operable to de-modulate said host  
signal from said current component of said power signal present on said  
12 single wire pair during communication of said host signal to said remote  
device.

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4. A host device in accordance with claim 1, comprising:  
2 host signal generation circuitry operable to generate a host signal;  
a host current modulator operable to modulate said current  
4 component of said power signal present on said single wire pair with said  
host signal while said voltage reference and control loop circuit enforces a  
6 substantially constant voltage component of said power signal present on  
said single wire pair during communication of said host signal to said remote  
8 device;

wherein said remote device comprises:  
10 a remote current de-modulator operable to de-modulate said host  
signal from said current component of said power signal present on said  
12 single wire pair during communication of said host signal to said remote  
device.

5. A host device in accordance with claim 1, wherein:  
2 said remote device comprises second remote signal generation  
circuitry operable to generate a second remote signal and a second remote  
4 current modulator operable to modulate said current component of said

power signal present on said single wire pair with said second remote signal  
6 during communication of said second remote signal to said host device; and  
said host device comprises:  
8 a second host current de-modulator operable to de-modulate said  
second remote signal from said current component of said power signal  
10 present on said single wire pair during communication of said second remote  
signal to said host device;  
12 wherein said voltage reference and control loop circuit enforces a  
substantially constant voltage component of said power signal present on  
14 said single wire pair during communication of said second remote signal to  
said host device.

6. A host device in accordance with claim 5, wherein:  
2 said voltage reference and control loop circuit comprises:  
a voltage generator which generates a substantially  
4 constant reference voltage during communication of said first  
remote signal to said host device;  
6 an operational amplifier having a first input terminal  
coupled to receive said reference voltage, a second input  
8 terminal coupled to said first wire, a feedback resistor coupled  
between said output terminal and said second input terminal,  
10 and an output terminal which outputs an operational amplifier  
output voltage signal that reflects a current that is passing  
12 through said feedback resistor, wherein said operational  
amplifier operates to mirror said reference voltage received at  
14 said first input terminal on said second input terminal;  
said first host current modulator comprises:  
16 a filter which filters said operational amplifier output  
voltage signal to recover said first remote signal; and  
18 said second host current de-modulator comprises:  
a filter which filters said operational amplifier output voltage  
20 signal to recover said second remote signal.

7. A host device in accordance with claim 3, wherein:

2           said remote device comprises second remote signal generation  
circuitry operable to generate a second remote signal and a second remote  
4   current modulator operable to modulate said current component of said  
power signal present on said single wire pair with said second remote signal  
6   during communication of said second remote signal to said host device; and  
said host device comprises:  
8           a second host current de-modulator operable to de-modulate said  
second remote signal from said current component of said power signal  
10   present on said single wire pair during communication of said second remote  
signal to said host device;  
12          wherein said voltage reference and control loop circuit enforces a  
substantially constant voltage component of said power signal present on  
14   said single wire pair during communication of said second remote signal to  
said host device.

8. A host device in accordance with claim 7, wherein:

2           said voltage reference and control loop circuit comprises:  
a voltage generator which generates a substantially  
4           constant reference voltage during communication of said first  
remote signal to said host device;  
6           an operational amplifier having a first input terminal  
coupled to receive said reference voltage, a second input  
8           terminal coupled to said first wire, a feedback resistor coupled  
between said output terminal and said second input terminal,  
10          and an output terminal which outputs an operational amplifier  
output voltage signal that reflects a current that is passing  
12          through said feedback resistor, wherein said operational  
amplifier operates to mirror said reference voltage received at  
14          said first input terminal on said second input terminal;  
said first host current modulator comprises:  
16          a filter which filters said operational amplifier output  
voltage signal to recover said first remote signal; and  
18          said second host current de-modulator comprises:

20 a filter which filters said operational amplifier output voltage  
signal to recover said second remote signal.

9. A host device in accordance with claim 1, comprising:  
2 host signal generation circuitry operable to generate a host signal;  
a host voltage modulator operable to modulate said voltage  
4 component of said power signal present on said single wire pair with said  
host signal during communication of said host signal to said remote device;  
6 wherein said remote device comprises:  
a remote voltage de-modulator operable to de-modulate said host  
8 signal from said voltage component of said power signal present on said  
single wire pair during communication of said host signal to said remote  
10 device.

10. A host device in accordance with claim 9, wherein:  
2 said voltage reference and control loop circuit comprises:  
a voltage generator which generates a substantially constant  
4 reference voltage during communication of said first remote signal to  
said host device;  
6 an operational amplifier having a first input terminal coupled to  
receive said reference voltage, a second input terminal coupled to  
8 said first wire, a feedback resistor coupled between said output  
terminal and said second input terminal, and an output terminal which  
10 outputs an operational amplifier output voltage signal that reflects a  
current that is passing through said feedback resistor, wherein said  
12 operational amplifier operates to mirror said reference voltage  
received at said first input terminal on said second input terminal; and  
14 said first host current de-modulator comprises:  
a filter which filters said operational amplifier output voltage signal to  
16 recover said first remote signal.

11. A host device in accordance with claim 9, wherein:  
2 said remote device comprises second remote signal generation  
circuitry operable to generate a second remote signal and a second remote

4 current modulator operable to modulate said current component of said  
power signal present on said single wire pair with said second remote signal  
6 during communication of said second remote signal to said host device; and  
said host device comprises:  
8 a second host current de-modulator operable to de-modulate said  
second remote signal from said current component of said power signal  
10 present on said single wire pair during communication of said second remote  
signal to said host device;  
12 wherein said voltage reference and control loop circuit enforces a  
substantially constant voltage component of said power signal present on  
14 said single wire pair during communication of said second remote signal to  
said host device.

12. A host device in accordance with claim 11, wherein:  
2 said voltage reference and control loop circuit comprises:  
a voltage generator which generates a substantially  
4 constant reference voltage during communication of said first  
remote signal to said host device;  
6 an operational amplifier having a first input terminal  
coupled to receive said reference voltage, a second input  
8 terminal coupled to said first wire, a feedback resistor coupled  
between said output terminal and said second input terminal,  
10 and an output terminal which outputs an operational amplifier  
output voltage signal that reflects a current that is passing  
12 through said feedback resistor, wherein said operational  
amplifier operates to mirror said reference voltage received at  
14 said first input terminal on said second input terminal;  
said first host current de-modulator comprises:  
16 a filter which filters said operational amplifier output voltage  
signal to recover said first remote signal; and  
18 said second host current de-modulator comprises:  
a filter which filters said operational amplifier output voltage signal to  
20 recover said second remote signal..

13. A host device couplable to a remote device via a single wire pair,  
2 said single wire pair comprising a first wire and a second wire, said remote  
device comprising first remote signal generation circuitry operable to  
4 generate a first remote signal and a first remote current de-modulator  
operable to de-modulate a host signal from a current component of a power  
6 signal present on said single wire pair when said host signal is  
communicated to said remote device, said host device comprising:  
8 a voltage reference and control loop circuit which enforces a  
substantially constant voltage component of said power signal present on  
10 said single wire pair during communication of said first remote signal to said  
host device; and  
12 host signal generation circuitry operable to generate said host signal;  
a host current modulator operable to modulate said current  
14 component of said power signal present on said single wire pair with said  
host signal while said voltage reference and control loop circuit enforces a  
16 substantially constant voltage component of said power signal present on  
said single wire pair during communication of said host signal to said remote  
18 device.

14. A host device in accordance with claim 13, wherein:  
2 said voltage reference and control loop circuit comprises:  
a voltage generator which generates a substantially  
4 constant reference voltage during communication of said first  
remote signal to said host device;  
6 an operational amplifier having a first input terminal coupled to  
receive said reference voltage, a second input terminal coupled to  
8 said first wire, a feedback resistor coupled between said output  
terminal and said second input terminal, and an output terminal which  
10 outputs an operational amplifier output voltage signal that reflects a  
current that is passing through said feedback resistor, wherein said  
12 operational amplifier operates to mirror said reference voltage  
received at said first input terminal on said second input terminal.

15. A host device in accordance with claim 14, comprising:

2 a first host current de-modulator operable to de-modulate a first  
remote signal from said current component of said power signal present on  
4 said single wire pair during communication of said first remote signal to said  
host device;

6 wherein said remote device comprises:  
first remote signal generation circuitry operable to generate said first  
8 remote signal;

a first remote current modulator operable to modulate said current  
10 component of said power signal present on said single wire pair with said  
first remote signal while said voltage reference and control loop circuit  
12 enforces a substantially constant voltage component of said power signal  
present on said single wire pair during communication of said first remote  
14 signal to said host device.

16. A host device in accordance with claim 13, comprising:

2 a first host current de-modulator operable to de-modulate a first  
remote signal from said current component of said power signal present on  
4 said single wire pair during communication of said first remote signal to said  
host device;

6 wherein said remote device comprises:  
first remote signal generation circuitry operable to generate  
8 said first remote signal;

a first remote current modulator operable to modulate said current  
10 component of said power signal present on said single wire pair with said  
first remote signal while said voltage reference and control loop circuit  
12 enforces a substantially constant voltage component of said power signal  
present on said single wire pair during communication of said first remote  
14 signal to said host device.

17. A host device in accordance with claim 16, wherein:

2 said first host current de-modulator comprises:  
a filter which filters said operational amplifier output voltage signal to  
4 recover said first remote signal.



18. A host device in accordance with claim 13, wherein:

2        said remote device comprises second remote signal generation  
circuitry operable to generate a second remote signal and a second remote  
4        current modulator operable to modulate with said second remote signal said  
current component of said power signal present on said single wire pair  
6        during communication of said second remote signal to said host device; and  
      said host device comprises:  
8        a second host current de-modulator operable to de-modulate said  
second remote signal from said current component of said power signal  
10       present on said single wire pair during communication of said second remote  
signal to said host device;  
12       wherein said voltage reference and control loop circuit enforces a  
substantially constant voltage component of said power signal present on  
14       said single wire pair during communication of said second remote signal to  
said host device.

19. A host device in accordance with claim 18, wherein:

2        said voltage reference and control loop circuit comprises:  
      a voltage generator which generates a substantially constant  
4        reference voltage during communication of said first remote signal to  
said host device;  
6        an operational amplifier having a first input terminal coupled to  
receive said reference voltage, a second input terminal coupled to  
8        said first wire, a feedback resistor coupled between said output  
terminal and said second input terminal, and an output terminal which  
10       outputs an operational amplifier output voltage signal that reflects a  
current that is passing through said feedback resistor, wherein said  
12       operational amplifier operates to mirror said reference voltage  
received at said first input terminal on said second input terminal;  
14       said first host current de-modulator comprises:  
      a filter which filters said operational amplifier output voltage  
16       signal to recover said first remote signal; and  
      said second host current de-modulator comprises:

18           a filter which filters said operational amplifier output voltage signal to  
recover said second remote signal.

20. A host device in accordance with claim 16, wherein:  
2           said remote device comprises second remote signal generation  
circuitry operable to generate a second remote signal and a second remote  
4   current modulator operable to modulate said current component of said  
power signal present on said single wire pair with said second remote signal  
6   during communication of said second remote signal to said host device; and  
said host device comprises:  
8           a second host current de-modulator operable to de-modulate said  
second remote signal from said current component of said power signal  
10   present on said single wire pair during communication of said second remote  
signal to said host device;  
12          wherein said voltage reference and control loop circuit enforces a  
substantially constant voltage component of said power signal present on  
14   said single wire pair during communication of said second remote signal to  
said host device.

21. A host device in accordance with claim 20, wherein:  
2           said voltage reference and control loop circuit comprises:  
a voltage generator which generates a substantially constant  
4   reference voltage during communication of said first remote signal to  
said host device;  
6           an operational amplifier having a first input terminal coupled to  
receive said reference voltage, a second input terminal coupled to  
8   said first wire, a feedback resistor coupled between said output  
terminal and said second input terminal, and an output terminal which  
10   outputs an operational amplifier output voltage signal that reflects a  
current that is passing through said feedback resistor, wherein said  
12   operational amplifier operates to mirror said reference voltage  
received at said first input terminal on said second input terminal;  
14   said first host current de-modulator comprises:

16 a filter which filters said operational amplifier output voltage  
signal to recover said first remote signal; and  
said second host current de-modulator comprises:  
18 a filter which filters said operational amplifier output voltage signal to  
recover said second remote signal.

22. A method for channeling signals between a host device and a  
2 remote device, said host device and said remote device connected by a  
single wire pair comprising a first wire and a second wire, and said host  
4 device supplying a power signal comprising a current component and a  
voltage component to said remote device over said single wire pair, said  
6 method comprising:  
at said host device, holding said voltage component of said power  
8 signal present on said wire pair substantially constant;  
at said remote device, generating a remote signal;  
10 at said remote device, current-modulating said remote signal with said  
current component of said power signal present on said wire pair; and  
12 at said host device, de-modulating said current component of said power  
signal present on the wire pair to recover said remote signal.

23. A method in accordance with claim 22, said method further  
2 comprising the steps of:  
at said host device, generating a host signal;  
4 at said host device, current-modulating said host signal with said  
current component of said power signal present on said wire pair; and  
6 at said remote device, de-modulating said current component of said power  
signal present on said wire pair to recover said host signal.

24. A method in accordance with claim 22, said method further  
2 comprising the steps of:  
at said host device, generating a host signal;  
4 at said host device, voltage-modulating said host signal with said  
voltage component of said power signal present on said wire pair; and

6 at said remote device, de-modulating said voltage component of said power  
signal present on said wire pair to recover said host signal.

25. A method in accordance with claim 22, said method further  
2 comprising the steps of:  
at said remote device, generating a second remote signal;  
4 at said remote device, current-modulating said second remote signal  
with said current component of said power signal present on said wire pair;  
6 and  
at said host device, de-modulating said current component of said power  
8 signal present on the wire pair to recover said second remote signal.

26. A method in accordance with claim 23, said method further  
2 comprising the steps of:  
at said remote device, generating a second remote signal;  
4 at said remote device, current-modulating said second remote signal  
with said current component of said power signal present on said wire pair;  
6 and  
at said host device, de-modulating said current component of said power  
8 signal present on the wire pair to recover said second remote signal.

27. A method in accordance with claim 24, said method further  
2 comprising the steps of:  
at said remote device, generating a second remote signal;  
4 at said remote device, current-modulating said second remote signal  
with said current component of said power signal present on said wire pair;  
6 and  
at said host device, de-modulating said current component of said power  
8 signal present on the wire pair to recover said second remote signal.

28. A method for channeling signals between a host device and a  
2 remote device, said host device and said remote device connected by a  
single wire pair comprising a first wire and a second wire, and said host  
4 device supplying a power signal comprising a current component and a

voltage component to said remote device over said single wire pair, said  
6 method comprising:  
at said host device:  
8 holding said voltage component of said power signal present  
on said wire pair substantially constant;  
10 generating a host signal; and  
current-modulating said host signal with said current  
12 component of said power signal present on said wire pair; and  
at said remote device:  
14 de-modulating said current component of said power signal  
present on the wire pair to recover said host signal.

29. A method in accordance with claim 28, said method further  
2 comprising the steps of:  
at said remote device:  
4 generating a first remote signal;  
current-modulating said first remote signal with said current  
6 component of said power signal present on said wire pair; and  
at said host device:  
8 de-modulating said current component of said power signal  
present on the wire pair to recover said first remote signal.

30. A method in accordance with claim 29, said method further  
2 comprising the steps of:  
at said remote device:  
4 generating a second remote signal;  
current-modulating said second remote signal with said current  
6 component of said power signal present on said wire pair; and  
at said host device:  
8 de-modulating said current component of said power signal present  
on the wire pair to recover said second remote signal.

31. A voltage reference and power loop control circuit for supplying  
2 power and channeling signals from a remote device over a single wire pair,

4       said single wire pair comprising a first wire and a second wire, said remote  
device operable to modulate a current component of a power signal present  
on said single wire pair with a remote signal, said circuit comprising:  
6               a voltage generator which generates a reference voltage;  
              an operational amplifier having a first input terminal coupled to receive  
8       said reference voltage, a second input terminal coupled to said first wire, a  
feedback resistor coupled between said output terminal and said second  
10      input terminal, and an output terminal which outputs an operational amplifier  
output voltage signal that reflects a current that is passing through said  
12      feedback resistor, wherein said operational amplifier operates to mirror said  
reference voltage received at said first input terminal on said second input  
14      terminal; and  
              a filter which filters said operational amplifier output voltage signal to  
16      recover said remote signal.